

# Mammals from the mid-Cretaceous Khodzhakul Formation, Kyzylkum Desert, Uzbekistan

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## Abstract

Six localities in the mid-Cretaceous (early Cenomanian) Khodzhakul Formation, western Kyzylkum Desert, Uzbekistan, produced mammalian remains of a possible zalambdalestoid (*Bobolestes*), a possible zalambdalestid, and two (*Sheikhdzheilia rezvyii*, gen. et sp. nov. and *Eozhelestes mangit*) or three zhelestids (“Zhelestidae” indet., unnamed large sp. A). This is termed the Sheikhdzheili local fauna. Previously, these mammals were recognized only as being three eutherians of uncertain affinities (*Bobolestes*, *Otlestes*, and *Oxlestes*) and a possible zhelestid (*Eozhelestes*). The reinterpretation of *Bobolestes* including “*Otlestes*” as a synonym could have an impact on phylogenetic reconstructions of basal Eutheria. With five eutherian species occurring at about 95 million years ago (early Cenomanian), the Sheikhdzheili local fauna is the earliest mammalian fauna to have more than two species of eutherian. European Campanian–Maastrichtian *Lainodon* and *Labes*, which have been argued to be zhelestids (and the hadrosaurid *Telmatosaurus*), retain ancestral traits reminiscent of earlier, early Cenomanian Asian taxa such as those in the Sheikhdzheili local fauna, suggesting that they may be isolates restricted on the European Archipelago after the formation of the Turgai Strait in the Turonian.

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## 1. Introduction

The fossil record of mammals during the mid-Cretaceous (approximately Aptian, Albian through Coniacian) is poorly known. In western North America relatively diverse mammal local faunas are known from the Cedar Mountain Formation around the Albian/Cenomanian boundary, the Cenomanian Dakota Formation, and the Smoky Hollow Member of the Turonian Straight Cliff Formation (Cifelli and Eaton, 1987; Cifelli, 1990, 1993, 1999a; Eaton, 1993, 1995; Cifelli and Muizon, 1997; Cifelli et al., 1997, 1999; Cifelli

and Madsen, 1998, 1999; Cifelli and Gordon, 1999; Eaton and Cifelli, 2001). In Asia only three areas have produced mid-Cretaceous mammals, and only one is relatively diverse. The two poorly sampled sites are the Cenomanian Tsondolein-Khuduk find in Gansu Province, China, which produced a single mammal axis (Bohlin, 1953; “*Khuduklestes bohlini*” of Nessov et al., 1994) and the late Cenomanian–early Turonian fossil site within the “Upper” Formation of the Mifune Group in Japan, which produced a dentary fragment with a single molar of *Sorlestes mifunensis* (Setoguchi et al., 1999).

More diverse mid-Cretaceous mammal faunas are known from what has traditionally been called Central or Middle Asia. This is a region commonly and long used

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by Soviet geographers in much the same way as terms such as the Great Plains are used in North America. Middle Asia is in fact located more in the southwestern portion of Asia. It extends approximately from the Caspian Sea in the west to the Chinese border in the east, and from the Iranian and Afghan borders in the south to southern Kazakhstan in the north. It essentially encompasses the newly independent countries of Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

The most diverse mammal faunas are those from the Turonian and possibly Coniacian of the central Kyzylkum Desert, Uzbekistan (see Averianov and Archibald, 2003 and Archibald and Averianov, *in press* for recent reviews). A lesser-known, early Cenomanian mammal fauna is known from six localities at four different places in the southwestern Kyzylkum Desert area (Karakalpakistan, western Uzbekistan; Fig. 1). All are confined to the Khodzhakul Formation (Nessov, 1993; Nessov et al., 1994; Averianov, 2000). These are the Khodzhakul site (SKH-20), Khodzhakulsai sites (SKH-5 and SKH-5a), Sheikhdzheili sites (SSHD-8 and SSHD-8a), and Chelpyk site (SCH-1). The first three localities are at different locations along a semicircular escarpment at the northern edge of the Sultanuvais [Sultanuizdag] Range, close to the Amu Darya (river). Chelpyk is an isolated hill with the ruins of a Khoresm castle at the top, some 30 km north of the escarpment. Khodzhakul is within the lower part of Khodzhakul Formation, whereas as the remaining localities are within the upper part of the formation. All localities appear to be early Cenomanian in age based on marine invertebrates that bracket the vertebrate localities (C. King, N. Morris, D. Ward, and M. Hampton, pers. comm. 2005).

Nessov first found mammals at Khodzhakul in 1978, and in 1979 at Sheikhdzheili (Nessov, 1982, 1984, 1985a). He and his team carried out surface collecting

and dry screening at Sheikhdzheili in 1980, 1981, 1982, and 1985. Most intensive was dry screening in 1982 when three tons of matrix were processed and 12 mammalian specimens were recovered. The locality was visited briefly by Nessov and Archibald in 1994 and by the international URBAC expedition in 1998, but no mammals were found. Thirteen tons of matrix were screenwashed at Sheikhdzheili by URBAC in 1999 and 2003, which produced 13 mammalian specimens. Altogether, over 30 mammalian specimens belonging to five or six taxa are now known from the Khodzhakul Formation, which are here referred to as the Sheikhdzheili local fauna. The subject of this paper is a discussion of this mammalian fauna and its paleontological implications.

### 1.1. Institutional abbreviations

CCMGE, Chernyshev's Central Museum of Geological Exploration, St. Petersburg, Russia; URBAC, Uzbek-Russian-British-American-Canadian joint expedition collections, now housed at San Diego State University; ZIN, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

### 1.2. Other abbreviations

AW, anterior width; L, length; PW, posterior width; TAL, talonid length; TAW, talonid width; TRL, trigonid length; TRW, trigonid width; W, width. All measurements are in mm. Diagnoses include a combination of what we interpret as derived characters (+), primitive characters (−), and characters of uncertain polarity (?).



Fig. 1. Map of Uzbekistan showing locations of Sheikhdzheili (S) and Dzharakuduk (D) local faunas.

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